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Exploring differences in stakeholders' perceptions of illegal bird trapping in Cyprus

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Running Title: Illegal bird trapping in Cyprus

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1 ABSTRACT

3 Background

4 Cyprus is recognized as a hotspot for illegal bird trapping in the Mediterranean basin. A
5 consumer demand for the Eurasian blackcap (*Sylvia atricapilla*) is driving the use of non-
6 selective trapping methods, resulting in the indiscriminate killing of millions of migratory
7 birds. Efforts to tackle the issue have so far been characterised mostly by a top-down
8 approach, focusing on legislation and enforcement. However, trapping levels are not
9 decreasing and conflict between stakeholder groups is intensifying.

11 Method

12 To understand why efforts to stop illegal bird trapping have not been effective, we used
13 semi-structured interviews to interview eighteen local bird trappers and nine
14 representatives from the pertinent environmental non-governmental organizations
15 (NGOs) and the governmental agencies responsible for enforcing the legislation.

17 Results

18 We found distinct differences between the views of the local trapping community and the
19 environmental NGOs, particularly on why trapping is occurring and its impact on the
20 avifauna. This disparity has contributed to misrepresentations of both sides and a high
21 degree of conflict, which is potentially proving counterproductive to conservation
22 interventions. In addition, it appears that trappers are a heterogeneous group, likely driven
23 by various motivations besides profit.

25 Conclusion

26 We argue that stakeholders interested in reducing illegal bird trapping need to develop
27 anti-poaching strategies that aim at minimizing the disparity in the views, and
28 subsequently the conflict, acknowledging also that trappers are not a homogenous group,
29 as often treated.

31 **Keywords:** Birds Directive, Blackcaps, Mediterranean, Migratory birds

BACKGROUND

Palaeartic-African migrant birds are in decline [1-3] and evidence suggests that direct mortality from overharvesting is one of the major drivers for many of those species [1, 4, 5]. Throughout the Mediterranean, people have benefitted from the hunting of migratory birds for centuries [6], and today, both legal and illegal hunting activities, result in millions of birds being shot or trapped each year as they migrate between Africa and Europe [5]. The illegal taking of wild birds is now recognised as a serious pan-European problem with clear conservation implications [7]. A range of international legal instruments and frameworks have thus been adopted to monitor and conserve wild bird populations [5], but have not yet proven successful in addressing the problem [8].

It is unclear whether this lack of success points towards the need for the current top-down enforcement strategies to be strengthened, as some stakeholders advocate [9, 10], or for a more holistic approach to be adopted – that aims to engage local communities. This dilemma largely relates to the on-going debate of how best to tackle the widespread illegal trade in wildlife [11], where increasing voices from the conservation community are advocating for the inclusion of local people in anti-poaching strategies [12, 13], as top-down enforcement strategies have similarly proved unsuccessful.

Though the issue of illegal bird trapping in the Mediterranean has not been part of this debate explicitly, it is very relevant, especially as the trapping levels continue to be high [5, 14]. A preliminary evaluation, based on data from twenty-six Mediterranean countries/territories, found that 11 to 36 million birds may be illegally killed or taken annually; affecting in total 456 species out of the 561 examined [5]. The reasons vary depending on the area and the species; for example, birds are illegally killed or taken for food, as a sport, for trade, and to be used as pets [5, 14, 15]. Passerine birds are impacted the most, followed by waterbirds, and raptors [5].

This issue is widespread and affects almost all of the Mediterranean countries [5, 15], but is perhaps epitomised within the Famagusta District in the island of Cyprus, which has been characterized by BirdLife International [14] as “the worst in the Mediterranean area for the mean estimated number of illegally killed birds each year”. According to Brochet et al. [5] every year a mean number of 689,000 of birds are being killed illegally in the Famagusta District alone. Cyprus provides an important stopover point for an estimated

150 million migrant birds of more than 200 species, as a number of migration flyways converge over the island [16, 17]. The seasonal trapping of small migrant songbirds in Cyprus has been carried out for centuries, and is therefore regarded by many within the local community as a traditional practice [16]. Once largely a fall-back food for the poor [10], blackcaps (termed locally as “ambelopoulia”) are still in high demand, providing a robust local illegal market [18]. Despite the anti-trapping legislation, which was introduced more than four decades ago (Protection and Development Game and Wild Birds Act of 1974 (No. 39/1974); [18]), recent years have seen a marked increase in trapping activities in certain areas [5], driven by the high demand for blackcaps as a traditional delicacy [15, 19].

BirdLife Cyprus, which has been carrying out systematic surveys for over ten years [19], reports that the island’s trapping activities result in the annual, large-scale, killing of more than 2.3 million birds [14, 15]. Warblers of the genus *Sylvia* and particularly the Eurasian blackcap (*Sylvia atricapilla*) are targeted [15, 20], although they are not game species. The birds are trapped using lime-sticks and mist-nets, which are illegal because of their non-selective nature. The use of this indiscriminate trapping equipment is therefore having a negative impact on numerous other species as well [15]. Although, the Eurasian blackcap has a large and increasing population [21], and is therefore not classified as a threatened species, several non-target species mistakenly trapped with lime-sticks and mist-nets are suffering from population decline and legally protected [5, 14, 15]. BirdLife’s surveys have documented more than 152 bird species becoming caught in either type of equipment, of which 78 are listed as threatened either in the Annex I of the European Union’s Bird Directive (2009/147/EC) or in Birdlife International’s list of Species of European Conservation Concern [15].

The reported number of birds caught annually has been questioned by some of the other stakeholders, due to the multiple assumptions in the method used, particularly those associated with the practical difficulties of monitoring an illegal activity [19]. As a response, BirdLife Cyprus organized a workshop in 2015, in which foreign experts were invited to improve the method. It was concluded then that although the previously reported figures may have been overestimated, the error was unlikely to be larger than 10% [19].

Scepticism concerning the extent of the ecological impact of the trapping activities is, however, likely to persist, especially within the trapping community. Additionally, the local trappers argue that hunting Eurasian blackcaps using lime-sticks represents a long-held tradition, which carries for them a cultural value, and therefore they should have the right to maintain it [19]. Yet, their exact opinions and attitudes towards the issue have not been surveyed before, and are largely anecdotal. To date, only a handful of scientific studies have been published on this issue; most of them more than a decade ago, aiming mainly at assessing the extent of illegal trapping [6, 16, 18], and with the social dimensions largely omitted. Little effort has been paid to understanding the multifaceted inter-relations between stakeholders, which are so often pivotal to the conservation agenda [22-24]. This study, which aims at bridging this knowledge gap, is the first to interview local people in Cyprus who are trapping birds illegally and the first to provide key insights into the motivations, attitudes and beliefs of small-scale trappers, who use the traditional trapping method, known as lime-sticks. It is also the first study to interview local representatives from NGOs and enforcement agencies; presenting in this way a holistic outlook of how the issue of illegal bird trapping is perceived by the majority of the key stakeholders.

METHODS

Study area

Cyprus is located in the northeast corner of the Mediterranean Sea (Figure 1), with an area of about 9,250 km², making it the third largest island in the Mediterranean [16, 25]. The island's biodiversity is considered rich, as it hosts more than 1865 plant species (of which 131 are endemic) and more than 380 bird species [25]. It is part of the Mediterranean Basin biodiversity hotspot [26] and it is one of the world's Endemic Bird Areas [25, 27]. Around 30% of the bird species of the island are known to have bred there at least once, but the majority of the birds recorded are migratory species, stopping over during their migration between Europe and Africa in the spring and the autumn [6, 16, 25, 27]. Many of these migratory species are of European and global importance and are protected under national and international legislation [10, 18].

For this study, we focused our data collection efforts on the villages of Agios Theodoros and Paralimni (Figure 1), based on information from BirdLife Cyprus, which identified

137 them as key trapping hotspots. Paralimni is a town located in the southeastern corner of
138 Cyprus, within the Famagusta District, and has a total population of 14,934 (according to
139 the population census from 2011;[28]). Of the economically active population, 13.7% is
140 unemployed and 86.3% employed [28]. Of those employed, approximately 2% works in
141 the primary sector (e.g., agriculture, forestry, and fishing), 15% in the secondary sector
142 (e.g., manufacturing, and construction), and 83% in the tertiary sector (e.g., wholesale
143 and retail trade, and accommodation and food services). The landscape in the area
144 consists mostly of matrices of human settlements, agricultural land, and natural habitats.
145 An Important Bird Area (IBA) and a Natura 2000 protected site, the “Paralimni Lake”
146 [25] is located within Paralimni’s administrative boundaries.

148 Agios Theodoros is a village situated within the Larnaca District of Cyprus. Similarly to
149 Paralimni its landscape is comprised of human settlements (albeit fewer), agricultural
150 land, and natural habitats. It also neighbours an Important Bird Area (IBA), the Atsas-
151 Agios Theodoros” site [17]. The village has a total population of 663. Of the
152 economically active population, 9.3% is unemployed and 90.7% employed. 43% work in
153 the primary sector, 19% in the secondary sector, and 38% in the tertiary sector [28]. One
154 participant, interviewed in Agios Theodoros, lived in Mazotos, a nearby village also
155 known for high trapping activity, with a population of 832 individuals [28]. Similarly to
156 Paralimni, 15.9% of the economically active population is unemployed and 85.1%
157 employed. 22% works in the primary sector, 20% in the secondary sector, and 55% in the
158 tertiary sector [29].

160 **Participants**

161 Eighteen local trappers were interviewed in total, all of whom were Cypriot and male.
162 Participants’ ages ranged from thirty-one to ninety. Twelve of them worked full-time, one
163 worked part-time, one was unemployed, and the rest were retired. Ten of the participants
164 lived in the village Paralimni, seven in Agios Theodoros and one in the village Mazotos.
165 All of the participants reported that they trap birds on a small-scale and only using lime-
166 sticks, never with mist-nets. Consequently, their views are only likely to be representative
167 of the small-scale trappers who nevertheless, based on the information collected from the
168 NGOs and the enforcement agencies, most likely represent the majority of the trappers,
169 although not necessarily the trappers with the largest impact (Table 1).

171 Although the main aim of this study was to interview the local trappers, to understand
172 better their motivations and attitudes towards illegal bird trapping, we additionally
173 interviewed nine key informants from four non-governmental environmental
174 organizations (NGOs) involved in the campaigns against illegal-bird trapping, and three
175 governmental agencies, responsible for enforcing the legislation. We did this to obtain a
176 more balanced perspective on the issue of illegal bird trapping in Cyprus and to
177 understand better the differences in stakeholders' perceptions. Those organisations were:
178 BirdLife Cyprus, the Committee Against Bird Slaughter (CABS), Friends of the Earth,
179 Terra Cypria, Game Fund, the Anti-Poaching Police Unit of the Republic of Cyprus, and
180 the British Sovereign Base Areas (SBA) Police Service.

182 **Data collection and analysis**

183 For all the interviews, we chose to use semi-structured interviews to enable the
184 exploration of individual motivations and attitudes towards various issues surrounding
185 illegal trapping. This method allowed for themes and topics to emerge whilst enabling the
186 informants to express their thoughts and opinions by answering from their own frame of
187 reference [30]. Semi-structured interviews are valuable when investigating sensitive
188 topics and are considered less threatening than questionnaires [31]. They offer the
189 opportunity for participants to talk freely, thus enabling the researchers to gather
190 background information and context while collecting in-depth information on each
191 participant's views, perspectives and motivations [32]. All interviews were conducted by
192 HJ and CM, a native Greek speaker, between May 29th and June 26th 2013. The
193 interviews with local trappers were conducted in Greek as most did not speak English. HJ
194 first asked the question in English and CM repeated it in Greek. The local trapper's
195 response was then translated to English by CM, allowing written notes to be taken by HJ
196 while the interview was conducted. The interviews with key informants from the NGOs
197 and the governmental agencies were conducted in English by HJ, in the presence of CM.
198 The interviews in English were recorded and transcribed later by HJ. In order to facilitate
199 discussion, individual question guides were used to ensure the main points were covered.

201 Purposive sampling was used, whereby participants with specific characteristics relevant
202 to the study were intentionally selected, as they were likely to be most informative [32,
203 33]. In particular, selected participants had to be involved in past or present trapping
204 activities and reside in communities with strong trapping culture. Respondent-driven

sampling was also appropriate given the sensitive nature of the research and subsequent small sample size. Local trappers were invited to participate via a single informant, a well-respected trapper, who made initial contact and encouraged other people to take part. These individuals subsequently let others know of the study and encouraged them to respond to the interview request. Participants were contacted based on whether they were currently or had ever partaken in the trapping of blackcaps. It was important to speak to people directly involved in managing the issue of illegal trapping. Key informants from NGOs and enforcement agencies were therefore contacted directly and meetings arranged over the telephone.

The data was analysed by HJ using the software analysis tool NVivo 10, which enabled the organisation of complex data (collected from both interviews with the local trappers and key informants) into emerging themes by means of coding. Coding was performed by HJ and used to identify patterns or themes within the data through highlighting normative statements, interesting facts and areas of disagreement [32]. Codes were categorised hierarchically with a small number of top-level codes representing the key themes, a group of subcategories according to source and finally, different attitudes on each particular theme/topic.

RESULTS

‘Trapper categories’ and feelings of misrepresentation

In contrast to most of the current campaigns against bird trapping, which do not appear to distinguish between the groups within the trapping community, key informants from the governmental and non-governmental bodies describe a range of ‘trapper categories’, from small-scale to professional (Table 1). Each category is intended to loosely represent a subgroup of trappers who share similar characteristics, such as incentives, type and amount of equipment used and the subsequent number of birds trapped (Table 1). Every trapper interviewed expressed the opinion that environmental NGOs and the media often misrepresent the trapping community by exaggerating the number of birds being trapped, portraying them all as being engaged in large-scale trapping activities, driven only by profit, and dismissing other non-monetary motivations. They felt that it was the more extreme types of trapping activity being presented, such as the use of mist-nets, which they felt is not representative of the trapping community. *‘They never portray the*

situation correctly. If they want to say something about the topic they usually show mistakes and that is not always the reality' (Trapper 3, age 53).

Motivations for trapping

Within the two villages sampled (Agios Theodoros and Paralimni) all eighteen interviewees described a strong history and tradition going back many generations of people trapping and consuming blackcaps, using lime-sticks. Besides trapping birds for personal consumption, the activity has also been a significant source of income, supporting local livelihoods and in recent years, funding their children's higher education. As one trapper mentioned: *'People make a profit out of selling birds. This is a family town and the money is saved to have the kids educated, to improve their lives'* (Trapper 7, age 55). Other motivations for trapping blackcaps also exist, which are not, however, solely income related (Figure 2). For instance, three trappers mentioned that they enjoy trapping, referring to it as a hobby that they do to relax and claimed that they only catch a small number of birds. *'For me, personally it is a way to maintain my health. When I go out I put out 10-15 lime-sticks, I forget about everything else and I relax'* (Trapper 10, age 55). The process of making the lime-sticks, preparing the orchard, trapping and then consuming ambelopoulia was described as being an important social activity that most could remember doing with their fathers and grandfathers since a very young age. Another trapper mentioned: *'I remember when I was a kid the whole extended family would prepare the lime-sticks. It was a very nice occasion for family gatherings and helped keep the family together. It was important for family cohesion'* (Trapper 13, age 31). The NGOs' key informants on the other hand, argued that trappers' main motivations are catching birds for personal consumption and profit (Table 1); other motivations were not mentioned as important.

Trappers' knowledge of the law

The interviews with the trappers revealed gaps in knowledge and perceptions regarding the laws regulating trapping activities and the potential subsequent ecological impacts trapping can have on the populations of vulnerable species [5]. The local trappers expressed a range of opinions in response to why they think that trapping is illegal (Table 2). Five participants responded that Cyprus had to prohibit the trapping of blackcaps due to pressure from the European Union and because they did not apply for a derogation during their accession. The second most common response was that people just did not

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273 know. None of the trappers referred to the indiscriminate nature of the trapping
274 equipment as a reason why trapping is listed as illegal under the national law and the
275 Birds Directive (Directive 2009/147/EC; [10]).
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277 **Trappers' knowledge of the ecological impacts**

278 When discussing whether traditional trapping practices, using lime-sticks, have an impact
279 on bird populations, thirteen of the trappers interviewed responded quite emphatically
280 that this was not the case and described the long tradition as evidence for this. *'It has*
281 *been proven that people in Cyprus have been capturing birds using these traditional*
282 *methods since the 16th century so if there was an impact then we wouldn't see this many*
283 *birds around'* (Trapper 10, age 55). Twelve trappers openly condemned the use of non-
284 traditional methods, particularly mist-nets, acknowledging their potential for negatively
285 impacting birds. *'It is right to be concerned because of the mist-nets and decoys, but the*
286 *lime-sticks do not have an effect, as it is something that has been happening for*
287 *thousands of years now'* (Trapper 1, age 58).
288

289 Although the non-selective nature of the equipment wasn't identified by any of the
290 trappers interviewed as a potential problem, every NGO representative interviewed
291 emphasised the non-selective nature of all the trapping equipment used as what makes the
292 activity potentially so damaging – since it can reduce populations of vulnerable species
293 for example or result in the local extirpation of species and the loss in genetic diversity
294 [5]. Trappers' responses concerning the actual number of other bird species caught for
295 every blackcap displayed considerable variation, but eleven of the trappers interviewed
296 stated that trapping species other than blackcaps was not a frequent occurrence. *'It's rare*
297 *to catch other species and because of the nature of the lime-stick you cannot catch any*
298 *big birds. If we sometimes catch a bird that is not a blackcap and it is not suitable for*
299 *consumption we release it'* (Trapper 9, Age 47). NGO representatives disagreed with this
300 claim as field surveys have shown that both lime-sticks and mist-nets capture often a
301 wide range of species, not just birds but also reptiles [15]. Additionally, some of the NGO
302 representatives maintained that because freeing birds captured on lime-sticks is a
303 particularly challenging and time-consuming task, it is highly unlikely that trappers
304 release any birds when they realize that those caught do not belong to the targeted
305 species.
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308 **Stakeholders' views on the law and enforcement measures**

309 The majority of local trappers interviewed (14 out of 18), considered the current laws
310 regarding trapping practices to be '*unfair*' with almost everybody saying that the fines
311 were too high. '*The laws are very, very strict especially for low use of lime-sticks. It is*
312 *unacceptable to catch somebody with 10 birds and fine them for €3,000*' (Trapper 3, age
313 53). Comparisons were frequently made between trapping and other illegal activities,
314 such as drug use. They often gave anecdotal evidence about people who were caught
315 dealing or using drugs but given a comparatively smaller fine. '*For example, this*
316 *happened to me personally, they caught me with one bundle of lime-sticks [24] and 4-5*
317 *birds and they fined me €1,200 euros while at the same time they gave a €600 fine to*
318 *somebody who was dealing drugs*' (Trapper 14, age 54).

319

320 Contrastingly, the NGOs and enforcement agencies believe that the fines are not high
321 enough and described the weak judicial system as a major challenge to effective
322 enforcement. The final stage of enforcement involves the court procedure and any person
323 accused of illegal trapping for the first time faces a potential fine of up to €17,000 and
324 three years in jail [34]. The enforcement agencies and environmental organizations
325 described the reality quite differently. One member of the Anti-Poaching Unit (APU),
326 possibly referring to large-scale trappers, described their frustration with the situation: '*It*
327 *is very easy to find a loophole in the law. We follow procedure and they go to court, but*
328 *they manage to escape paying a big fine, instead only paying a small amount in*
329 *comparison to how much money they are making. It is not a big deal for them to pay*
330 *€4,000 or something similar*'. Although it is difficult to know how much money
331 individual trappers make by catching and selling blackcaps, the total worth of this illegal
332 activity has been estimated by the authorities to be around 15 million euros annually [10,
333 34]. It is not known however what percentage of that goes to large-scale trappers, who
334 use mostly mist-nets and decoys to lure birds, and what percentage goes to trappers who
335 catch birds at a smaller scale using lime-sticks.

336

337 Most NGOs and enforcement agencies also identified the length of time between arrest
338 and court trials as a significant factor leading to non-deterrent prosecutions. The APU
339 stated the following: '*You arrest somebody and it might take two years for them to face*
340 *trial, during which time they continue making an income from trapping. You might catch*

1 341 *them another four times during this period and it looks like he has been caught once as*
2 342 *the court just puts them all together’.*

3 343 4 344 **Contentious conservation**

5 345 The role of conservation organisations in the trapping debate is highly contentious in
6
7 346 Cyprus, particularly within the village of Agios Theodoros and villages in Famagusta
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9 347 District. According to the trappers interviewed, local people are not supportive of the
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11 348 conservation efforts carried out by organisations such as CABS, and there is a great deal
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13 349 of tension between the two stakeholder groups, sometimes even resulting in physical
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15 350 confrontations as reported multiple times in the local media [20, 35]. Local trappers often
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17 351 expressed scepticism when asked about their attitudes towards the motivations of the
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19 352 environmentalists, suggesting in order of frequency that: 1) they have a financial
20
21 353 incentive to do this work; 2) their aim is to create a negative image of the people
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23 354 trapping; 3) ‘*they have nothing better to do*’ and finally; 4) they do it to preserve the
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25 355 birds. On the other end of the spectrum, based on our interviews with the key-informants
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27 356 from the environmental NGOs, conservationists seem to have the opinion that the non-
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29 357 monetary motives for trapping, expressed by the locals, are minor and unimportant. Most
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31 358 advocate for zero-tolerance and stricter law enforcement [10], and treat local trappers as a
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33 359 homogenous group, driven by the same motives, mostly conducting an illegal activity on
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35 360 a large-scale merely for profit.

36 361 37 362 **DISCUSSION**

38 363 It is evident from the responses of the local trappers, the representatives of the
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40 364 environmental NGOs and the management agencies, that the human dimensions of the
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42 365 issue of illegal bird trapping in Cyprus are complex and conflicting. Our work describes
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44 366 the beliefs and attitudes of the groups involved, and allow us to understand better the
45
46 367 dynamics that are ultimately shaping the way in which stakeholders are behaving and
47
48 368 reacting to this important conservation issue.

49 369 50 51 370 **Lack of understanding and trust**

52 371 It is reasonable to suggest, since trapping levels are still high [15], that current anti-
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54 372 poaching measures are not proving successful. Although several factors could be
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56 373 contributing to this lack of success, such as the absence of strong will on behalf of
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58 374 politicians [19] and insufficient law enforcement resources [36-38], we believe that the

lack of understanding and trust between the trapping community and the conservationists is a key stumbling block inhibiting conservation success [39]. The communication gap between the two groups acts as a breeding ground for high stakeholder conflict [22], and allows for misunderstandings on the issue to persist, such as on why the practise is illegal and what the potential ecological impact is, especially on threatened species. This is illustrated by no trapper suggesting the indiscriminate nature of lime-sticks as a reason for their being illegal, despite the fact that this is a key part of the reasoning behind the prohibition of lime-sticks under national and international law (Protection and Development Game and Wild Birds Act of 1974 (No. 39/1974); [18]). The non-selective nature of the trapping activities is one of the two key messages that NGO's aim to communicate, the second being the large scale at which trapping is occurring [15]. Although it is possible that members of the trapping community are choosing to ignore or not understand this aspect (as it is against their interests to do so), it is probable that the lack of trust and communication between the two groups, which is exacerbated by misrepresentations, is preventing the message from reaching the community.

Imprecise portrayal of the trappers

The interviewed tappers felt strongly that their portrayal in the anti-poaching campaigns and the media is unfair and unrepresentative, i.e., as organized criminals trapping birds on a large-scale and being driven only by profit. Although such groups do exist, according to most of the stakeholder groups interviewed, those that engage in 'professional' or 'large-scale' trapping for profit, constitute between 5-20% of the total trapping community (Table 1). It is however, this image that the environmental NGOs and the media portray, making it appear to the public as the primary form and reason for trapping. The presence of such organised trapping activities and its impact on bird populations is likely to be significant [5, 15] and it requires different anti-trapping strategies than the rest of the trapping community. Using the same approach for all trappers and treating them as one homogenous group with the same motive is neither accurate nor effective.

Each participant of this study described his own connection with trapping, explaining its importance at the personal, and also often at the village level within a strong historical context. It is clear that this activity is often highly valued for both its intrinsic sociocultural and economic value (Figure 2). For the development of effective conservation measures, which should be tailored to each trapping subgroup, it is

necessary that these values are understood and not discounted [8, 40]. The failure of most anti-trapping campaigns to accurately present and account for the different categories of trappers and their diverse motives, has possibly created a credibility gap for the conservation advocates. This loss of credibility, additionally to the conflict, may have resulted in the trappers, and potentially the general public dismissing the campaigners' conservation messages, making addressing the problem even more challenging.

Another apparent challenge is the lack of key data essential for understanding better the issue and the characteristics of each trapper subgroup. Currently it is still unclear what the actual number of trappers is, what percentage of those trap birds on a small-scale, for example for personal consumption only, and what percentage trap birds on a larger scale for illegal trade and profit. It is also unclear how many trappers use lime-sticks vs. mist-nets, how often, what percentage of birds are trapped with each method, and what percentage in each case is traded.

CONCLUSIONS

The conservation community is increasingly recognising that issues such as poaching and wildlife trade are multifaceted [29] and driven by complex social, cultural and economic factors [39, 41, 42]. Overreliance on enforcement measures not only fails to address these complexities, but can prove counterproductive by, for example, driving trade further 'underground'[41]. Although we acknowledge that environmental NGOs are correct in identifying lack of political will [10] and insufficient enforcement of the current laws as factors hindering conservation success [43], we argue that anti-trapping efforts need to be adjusted and acknowledge the realities on the ground and the differences between the trappers. Efforts must account for the complex social dimensions [8, 24] behind this conservation issue and engagement of the local communities is needed where trapping occurs the most. It is therefore suggested to adopt a more inclusive, participatory approach that aims to recognise the views of stakeholders at local, national and global levels. Efforts should simultaneously be made to better address the drivers of poaching and empower local communities, through innovative and alternative schemes, to participate in the protection or sustainable management of wildlife populations. Given the transboundary nature of Palearctic-African migrant birds, such strategies will prove most effective when undertaken across their entire range [1]. Thus, the use of a holistic

approach and recognizing the importance of understanding these underlying human dimensions should also be applied within its widest possible context.

LIST OF ABBREVIATIONS

APU: Anti-Poaching Unit

CABS: Committee Against Bird Slaughter

IBA: Important Bird Area

NGOs: Non-Governmental Organizations

SBA: Sovereign Base Areas

DECLARATIONS

Ethics approval and consent to participate

A process of free and prior informed consent was followed during which the research objectives were made explicit. Participation was not obligatory and all respondents had the right to not disclose personal information, to withdraw any information from the record, and to end the interview at any point. The personal opinions and views of the researchers were not expressed during the interviews and an objective and unbiased approach was maintained at all times. The project was prior approved by committee at Imperial College London.

Consent for publication

Participants were informed that results would be presented in a scientific article and gave their approval

Availability of data and materials

Please contact HJ for data requests.

Competing Interests

The authors declare that they have no competing interests.

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Authors' contributions

476 CM, HJ, AK designed the study. HJ and CM collected the data. HJ analysed the data.

477 All authors contributed to the writing of the manuscript.

478

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482

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489 interactions between people and their environment.

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Figure 1. Map showing the location of the two villages in Cyprus, Agios Theodoros and Paralimni, where the interviews with the local bird trappers were conducted.

Figure 2. Diagram summarizing the range of potential motivations for trapping, as described by all stakeholder groups in the study

Table 1. Summary of ‘trapper categories’, as defined by the key-informants of the enforcement agencies and the environmental NGOs, indicating: a) an estimate of the number of people involved, b) the possible motives, c) estimates of the equipment they use, and d) the impact they may have. The information provided in this table reflects the opinions, knowledge, and experience of the different stakeholders. Please note that two of the environmental NGOs did not have relevant information to provide.

	Categories	Number of people trapping		Incentives	Equipment (per person)	Numbers of birds trapped/impact
Enforcement Agency 1	1) Traditional trappers	-		Personal consumption	20-30 lime-sticks	The large number of low-scale trapping has a significant impact
	2) Organised criminals	40-50 people in total (4-5%)		Profit	Maybe 30 mist-nets & 500 lime-sticks	Highest impact, as catching most amount of birds
Enforcement Agency 2	1) Non-professionals	-		Personal consumption	-	-
	2) Professional trappers	10-15 people in total (within the SBA)		Profit	-	-
Enforcement Agency 3	1) Traditional trappers	A lot more than 2000 people in total		Personal consumption/hobby	Lime-sticks	Catch a limited number of birds as they don't use lures
	2) Business-scale			Profit	-	-
Environmental NGO 1	1) Small-scale trappers	60-85%	500 to 1000 in total	Hobby	<50 lime-sticks and/or 1 mist net	c. 2 million birds altogether
	2) Medium-scale trappers	10-30%		Supplementary income	50-100 lime-sticks and/or 1-3 mist nets	
	3) Big trappers (professionals)	5-10% (10-20 people)		Profit	>100 lime-sticks and/or 4+ mist nets	
Environmental NGO 2	1) Small-scale trappers	50-60%	1,500 to 2,000 in total	Personal consumption	25-50 lime-sticks or 1 mist-net & 1 decoy	c. 2 million birds altogether
	2) Medium / Semi-professional trappers	30-40%		Personal consumption/profit Political rather than cultural incentive	75-100 lime-sticks, 2-3 mist-nets & 2 decoys	
	3) Professional trappers	10-20%		Profit	200 lime-sticks, more than 5 mist-nets	

* ‘-’ = No information was provided

Table 2. A selection of trapper responses as to why they think that trapping is illegal (in order of frequency).

Number of times the response was given	<i>"Why do you think that it is illegal to trap birds?"</i>
5	<i>I think that it is because we agreed upon a EU directive without asking for a derogation from the law to trap on a traditional basis</i>
3	<i>I don't know</i>
2	<i>The only reason it is illegal is because they haven't found a way to tax it yet and because they assume that some of us are making a large amount of money out of this, which is not true</i>
2	<i>I am very aware of the laws. It happened during the Bern Convention when all states decided to protect birds that are less than 7.5cm (including ambelopoulia)</i>
1	<i>The government had to prohibit the trapping and consumption of ambelopoulia because of pressure from the EU and threats that their tourism will be affected</i>
1	<i>English used to live here and they made the law 50-200 years ago and it still runs today and goes on and on</i>
1	<i>It's all about the money. They decided to prohibit it because they thought the people were making too much money out of it. I don't think that it is about protecting the birds because I don't think that there is a risk to the birds. I think that it is about the high prices</i>
1	<i>It's because of the media's exaggeration and misinformation</i>
1	<i>It has always been illegal but people were allowed to do it in the past</i>



